
THUNDERHAWK
AH-73M

CONTENTS

INTRODUCTION

As the twentieth century drew to a close, the U.S. Military invited a number of manufacturers to submit designs for a lightweight multi-role attack helicopter. The prime design criteria were for an aircraft capable of true all weather nap of the earth (NOE) flight, delivering a wide range of ordinance over a short range. The prototype designation being Multi-role Experimental (MRX). Of the several proposed designs only one received funding for Phase I development, this being the MRX-73M.

The MRX-73M design centred around the extensive use of carbon composites to provide an exceptionally light airframe. Power came from twin turboshafts themselves incorporating many ceramic components to further reduce weight. The main rotors were of glass-fibre construction incorporating a LIVE (Liquid Inertia Vibration Elimination) system.

Flight efficiency was increased by the use of NOTAR (no tail rotor) technology instead of the traditional tail rotor. (NOTAR uses the flow of exhaust-gasses channelled through a number of slots in the tail-boom to counteract main-rotor torque.)

A comprehensive array of flight and fire control systems reduce load on the pilot and allow effective night and poor visibility attacks.

To complement the new helicopter, a new range of compact missiles were developed, designed for use at close range and at low altitudes. These weapons included both air-to-ground and air-to-air missiles and a new, small calibre rocket system.

To this date, only a single example of the MRX-73M is flying, the AH-73M, ''THUNDERHAWK''.

You join the pilots of MERLIN, a crack assault team commissioned by the United Nations. Your job is to defuse crisis situations around the world, preventing their escalation into full-scale conflict. With MERLIN you will fly the newly commissioned Thunderhawk attack helicopter against forces around the world.

LOADING AND INSTALLATION

Commodore Amiga

This version requires an Amiga with at least 512K RAM and a mouse.

512K of extra RAM is recommended for this version.

1. Turn off your computer.
2. Plug mouse into port 1 (the normal port).
3. Turn on the computer.
4. Insert Amiga KICKSTART disk into the disk drive. (Amiga 1000 only).
5. When the 'Workbench' icon appears, insert THUNDERHAWK DISK 1. The game will load and run automatically. Exchange disks only when instructed to do so.

Atari ST

This version requires an Atari 520 or 1040 ST with disk drive, a colour monitor or television, and a mouse.

512K of extra RAM is recommended for this version.

1. Turn off your computer.
2. Plug mouse into port 1 (the normal port).
3. Insert THUNDERHAWK DISK 1 into drive.
4. Turn on the computer. The game will load automatically. Exchange disks only when instructed to do so.

IBM/PC & 100% compatibles

This version requires an IBM compatible computer with at least 640K of memory, a disk drive, and an EGA, VGA or TANDY compatible video-card.

Recommended for this version are 12 Mhz processor or above, Hard disk drive, Microsoft compatible mouse or analogue joystick, Roland™, Adlib™ or Soundblaster soundboard.

Playing from floppy disc

1. Turn off your computer.
2. Plug in your joystick or mouse (if you are using one).
3. Insert your DOS disk (if you are booting from floppy disk).
4. Turn on the computer.
5. When the cursor appears, place THUNDERHAWK DISK 1 into drive A or B.
6. Type 'A:' or 'B:' (whichever drive you put the disk in) and press Return.
7. Type 'THUNDER' and press Return.

Installing onto a hard disk

1. Boot your computer with DOS.
2. Insert THUNDERHAWK DISK 1 into drive A or B.
3. Type 'A:' or 'B:' (whichever drive you put the disk in) and press Return.
4. Type 'INSTALL' and press Return.
5. Follow the on-screen instructions.

Playing from hard disk

1. Boot you computer with DOS.
2. Type 'C:' (if your hard disk isn't C:, enter the correct letter).
3. Type \ THUNDER and press Return.

Disk Protection

Always keep your THUNDERHAWK disks write protected. This will prevent accidental loss of data and prevent viruses from infecting your disks.

Manual Protection

After the introductory sequence has finished, you will be asked to enter your name and will be required to consult this manual for the purpose of a protection check. You will be asked to input a word from the manual which will be referenced by page number, line number and word number, e.g.:

Please input the word at:	PAGE	7
	LINE	1
	WORD	1
the word is:	AFTER	

(NB) Titles and headings are not included as lines.

The Common Room

The common room is the place where pilots rest between missions and is the place where all games begin. From here you can:

a) Use the Flight Simulator to improve your piloting skills. To enter the simulator simply click the hand cursor anywhere on the simulator.

b) Enter the war room to choose a campaign or recap on the current campaign. To enter the war room, click on the door on the far right of the screen.

c) Enter the mission briefing room to begin a mission. To enter the briefing room, click on the door on the right of the screen.

d) Use the Desktop computer to save your current game or to reload old games. To use the computer simply click anywhere on the computer.

e) View your current rank and decorations. To review your pilot information, click on the locker in the middle of the screen.

The Flight Simulator

The flight simulator allows inexperienced pilots to improve their flying skills without endangering their lives or a multi-million dollar machine. On entering the simulator you are presented with an options menu allowing you to select the time of day and the skill level of enemy units. Use the cursor to change the options and click on the GO icon to enter the simulation. The simulator accurately recreates the flight characteristics of the Thunderhawk although you will be provided with unlimited weaponry. The simulator can be excited at any time by pressing the escape key.

The War Room

The war room is the place from which all campaigns are commanded. Teams of tacticians constantly monitor military and political situations around the world. From here you can select one of the six campaign theatres or recap on the current campaign. To view a campaign, click on one of the circles marked on the world map in the middle of the screen. This will bring up a map of the campaign (on the right of the screen) and a tactician will provide you with background information.

To select the campaign, simply click on the campaign map. From there you will be taken to the briefing room where you will be given a detailed briefing of the campaigns' objectives.

The Briefing Room

Before you enter combat, Jack Marshall, your chief tactician, will provide you with a full mission briefing allowing you to carefully plan your attack and select appropriate ordinance. Jack has access to all relevant information and will provide you with the latest strategic updates. Jack is an expert in his field and only a foolhardy pilot would ignore his advice. Each section of the briefing can be stepped through by clicking anywhere on the screen, the escape key will exit the briefing.

The Desktop Computer

Thunderhawk is a very large game and only a player with great stamina would attempt to complete the game in one sitting, therefore a game save option has been provided. On entering the file system a large disk is displayed on screen with a list of options:

LOAD	– Load a previously saved game from current disk.
SAVE	– Save present game to current disk.
DEL	– Erase pilot off current disk.
NEW	– Exit current game and return to startup screen.

To exit the desktop computer, click the pointer anywhere outside the disk.

N.B. Use blank disk for character disc and not game discs.

View Player Statistics

As you progress through Thunderhawk you may be awarded various decorations for your skill and courage. A good player may also receive increments in rank if the Pentagon are sufficiently impressed by your performance. In addition to these you will always receive a campaign ribbon on completion of a campaign. You can judge your overall performance by rank and medals bearing in mind that the ultimate player may receive 6 medals, 6 ribbons and the rank of colonel.

Arming Screen

On exiting the briefing room you are taken to the arming screen where you select appropriate ordinance for the forthcoming mission. The Thunderhawk can carry a wide range of offensive and defensive equipment but the right selection is vital if your mission is to be successful.

At the top right of the screen is a picture of the currently selected weapon with an information panel below. Clicking over the two arrow icons will flip through the list of available weaponry. To add a weapon to the helicopter, click the cursor over one of the underwing pylons (or wingtip pylons when adding air-to-air missiles). Pylons can often carry more than one weapon each and clicking the left button (or space bar) again will add more of the same weapon. To remove weapons from a pylon, click over the pylon with the right button (or backspace key). To replace the weapons on a pylon, simply select the new weapon and click over the pylon.

Although each pylon is capable of carrying the same weight of weapons, bombs can only be added in pairs, the bombs occupying the same pylon under each wing.

To make life easier, an auto-arm option has been included which will automatically add a suitable weapons load. This is particularly suited to new pilots as the more experienced flyer will develop his (or her) own combat style suited to a more varied weapons load.

In addition to the weapons you select, you will always have the 30mm cannon, a formidable weapon in itself.

To exit the arming screen, click on the EXIT icon at the bottom right of the screen.

Flying The Mission

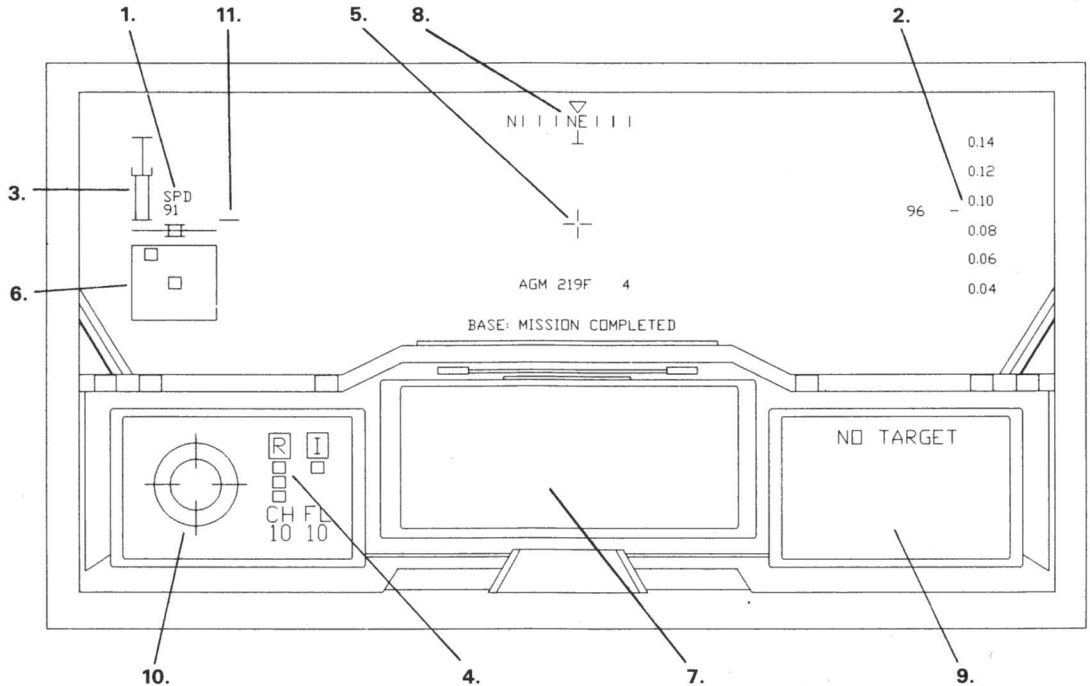
Your mission may begin from your home base or, if the objective is some distance away, the auto-pilot will fly the aircraft into the mission area. The mission area is defined as 'An identifiable area of concentrated enemy forces' and in practical terms consists of a circle of action around the mission objective. In all attack missions the primary target must be destroyed for the mission to be successful, failure will usually result in the campaign being lost and you being demoted or dismissed from service. Secondary targets are generally opportunist targets, unnecessary for mission success although the destruction of air-defences may well make later missions easier. Generally the best idea is to use stealth tactics to reach the primary target and leave any secondary targets for the trip home. The quickest way to leave the mission area is to follow the base way-marker on the compass. Depending on the mission, once you have completed your objective, either the autopilot will return you to base, or you will have to follow the base way-marker above the compass and land your aircraft back at base.

The Debriefing Room

After each mission is completed you will receive a full debriefing from Jack. Your performance will be discussed along with any tactical updates. Should your performance prove to be unsatisfactory, Jack may have no alternative but to dismiss you from service. Particular note will be taken when allied lives are at stake, although a poor performance will never go unnoticed. Should your performance be particularly good, Jack may well recommend you for a promotion. The debrief can be stepped through by clicking the left mouse button, the Escape key will return you to the common room.

Cockpit Instrumentation

In a move to reduce load on the pilot, the Thunderhawk features a system of multi-function monitors coupled to an integrated TADS (Target Acquisition/Designation Sight). The system is designed to reduce the percentage of the pilot's time actually flying the machine and so improve combat performance. The system features just three multi-function displays in the cockpit, all other information being displayed on the HUD (Heads Up Display).



1. **Airspeed**—Displays your horizontal speed in knots

2. **Altimeter**—On the left is your altitude in feet; on the right is the scale on which each mark represents 20 feet.

3. Collective–The position of the bar represents the amount of power being fed to the main rotor. When the bar is over the centre mark the engine is producing the correct amount of power for level flight. If it is above the centre mark the engine produces more power, if it is below the centre mark it will produce less power.

At low altitudes ground effect and turbulence will affect air-flow over the rotors and the amount of power needed for level flight will change. A wise pilot will not attempt to fly fast at low altitudes.

4. Countermeasures–The R symbol represents the status of your radar jammer, the three lights below it represent – from top to bottom – radar guidance, radar track and radar search. The guidance light warns that the enemy have launched a radar guided weapon towards you. The tracking light warns that an enemy radar has locked on to your precise position. The search light warns that an enemy has detected you on radar.

The I symbol represents the status of your infrared jammer. The light below it warns that the enemy have launched an infrared guided weapon at you.

Below the two sets of lights are two digits representing the number of chaff and flare cartridges you are carrying.

5. Cross-hair–The cross-hair appears when you select an unguided weapon. All weapons are calibrated to fire at the centre of the cross-hair although you must take gravity into account when using your cannon. Below the cross-hair is the name of the currently selected weapon along with the quantity remaining.

6. Cyclic Joystick–The cyclic joystick is represented by a small box within a larger box (below the air-speed indicator). Moving the mouse/joystick moves a small cursor. When the cursor is positioned within the smaller box, the helicopter will hover. If the cursor is moved out of the smaller box the helicopter will move in the direction of the cursor.

7. Damage Control Computer–The computer provides you with a constant update on the condition of your aircraft as well as listing your available weapons. Pressing D will switch the computer between Damage & Stores mode although the computer will always switch to Damage mode if you take a hit.

8. Heading Indicator–The vertical line below the compass indicates your current heading. The arrow above the compass shows you the course to follow to your current target. The vertical line above the compass will always indicate the correct heading back to your base. This should always be used after completing your mission.

9. Multi-Mode Camera–The camera has two modes of operation, Targeting mode and Landing mode. Targeting mode provides a video image of the currently designated target along with its range in feet. If you have selected bombs as your current weapon, the display will switch to Bombing mode and give a view of directly below the helicopter. Landing mode simply displays a view downwards from your helicopter.

10. Threat Display–This displays all radar threats within a range of 4 km. Ground threats are displayed as orange dots. air threats as red dots and missiles as white dots. As you approach a target, the display will switch to close-range mode with a range of 1.8 km.

11. Vertical Speed Indicator (VSI)–Displays how fast the helicopter is ascending or descending. When the slider is above the centre-line, the helicopter is climbing and when it is below the centre line you will be descending.

FLIGHT CONTROLS

The traditional flight controls of a helicopter comprise of three separate inputs. These effectively tied up both hands and both feet making it difficult for the pilot to do anything else but fly. With the advent of fly-by-wire control systems, designers managed to replace two pedals, two joysticks and a twist-grip with a single joystick. The 4-axis control stick allows the pilot to control the helicopter with just one hand. Thunderhawk is controlled by using a mouse, an analogue joystick (PC version only) or on keyboard although in all cases a few key presses will be necessary.

Mouse/Joystick Control

The Mouse Buttons:

Clicking the right mouse button changes the current selected weapon for the next available one.

Clicking the left mouse button fires the currently selected weapon.

Clicking the left button with the right button held down selects the next designated target.

With No Mouse/Joystick Buttons Pressed:

Moving the mouse/joystick forwards causes the helicopter to tip down allowing it to move forwards.

Moving the mouse/joystick backwards causes the helicopter to tip upwards allowing it to move backwards.

At low speeds, moving the mouse/joystick left and right causes the helicopter to move sideways. With the mouse/joystick pushed forward and to the left or right, the helicopter will bank and turn in that direction.

Holding Down The Right Mouse Button:

Moving the mouse/joystick forwards with the right button pressed increases power to the main rotor, allowing the helicopter to rise.

Moving the mouse/joystick backwards with the right button pressed decreases power to the main rotor, allowing the helicopter to fall.

In level flight, at low speeds, moving the mouse/joystick left and right with the right button pressed causes the helicopter to rotate around its own axis.

Keyboard Control (PC only)

Collective:	Keys 1–7 on the main keyboard select power (1=0%, 7=100%).
Cyclic:	Z–Left, X–right, O–Up, K–down.
Rotate:	A–Rotate Left, S–Rotate Right.
Fire Weapon:	Space Bar fires the current weapon.
Select Weapon:	Backslash (to the left of Z key) selects the next weapon.
Select Target:	0 on the main keyboard.

Keyboard Controls (all formats)

Toggle Radar Jammer on/off:	F1
Toggle IR Jammer on/off:	F2
Launch Chaff Cartridge:	F3
Launch Flare:	F4
Toggle Night Sight On/Off:	F10
Toggle Camera Mode:	C
Toggle Damage Computer Mode:	D
Pause Game:	P

Viewpoint Selection

Viewpoint manipulation is mostly controlled from the keypad, although several other keys are used.

View from Target:	F6
View from Weapon:	F7
View from Cockpit:	F8
Internal/External view:	ENTER (on the numeric keypad)
Rotate view in Y-axis:	8 or 2 (on the numeric keypad)
Rotate view in X-axis:	4 or 6 "
X-rotate 90 degrees:	1 "
Y-rotate 90 degrees:	3 "
Zoom in:	7 "
Zoom out:	9 "
Satellite view:	5 "
Reset external view angles:	0 "
Toggle map view on/off:	M
Zoom out map view:	+
Zoom in map view:	–

THE CAMPAIGNS

Campaign Overview

Thunderhawk features six campaigns, each comprising of a number of individual missions. As you progress through the campaign, you will be asked to perform the roles of ground attack, escort, interceptor, etc. In all cases, many hundreds of lives rest on your skill and commitment. The team of MERLIN will give you all the required information and support but there is only one pilot, YOU. An inexperienced pilot should take care when choosing a campaign. Always consult the technical information on each campaign and ascertain the number and type of enemy units you will be up against.

CAMPAIGN ONE – Europe

Vladimir Arastov, the top Soviet nuclear physicist who's been on Washington's most wanted list for the last fifteen years. A man who has been responsible for so many significant Soviet nuclear developments, Moscow has kept him under very tight security for obvious reasons. In fact, he's on his first outing from Moscow for twenty years, and the news has broken, that he want to defect.

He's scheduled to visit a power plant in Soviet Eastern Europe tomorrow night as part of a scientific advisory tour. It's the closest he's ever likely to get to Western soil and he's contacted Washington with details of his movements and an outline of his own plan to get out.

This is where you come in . . .

As part of the elite MERLIN team you are to make an air strike on the power plant to create a diversion for Arastov. He is confident that in all the confusion he can escape by road along a route towards the border. Whilst he's running, your tasks will be to draw Soviet attention away from him. He'll be in contact via a scrambled radio link so that if anything goes wrong your team can react quickly and improvise. Washington has given its assurance that his plan is solid, but you never know . . .

They want him so badly they're prepared to go along with it, after all, it's probably the only chance they'll have to get him.

Of course, Arastov has picked a fine time to do this. Latest intelligence information on Soviet armoured units in the area, shows that they're currently on manoeuvres.

But, if you can really create some havoc, they won't know what's going on until he's been debriefed in Washington!

CAMPAIGN TWO – South America

''Our message to the drug cartels is this: The rules have changed. We will help any government that wants our help. When required, we will for the first time make available the appropriate resources of America's armed forces.''

George Bush – September 5 1989

MERLIN has been sent to South America as part of a goodwill gesture by the U.S. government. The government of this republic have been cracking down on drugs operations and have asked for assistance. So, after Bush's declaration in '89, Washington can hardly refuse.

You are to assist in destroying the operations of a major drugs cartel whose base is out in the desert. They are very well armed and employ numerous foreign mercenaries who will stop at nothing to keep intruders at bay.

Firstly, you'll be sent in to strip out their communications network. Then, cut off their escape routes before finally destroying their processing labs. You've got to wipe them off the face of the map, but it won't be easy. They know this region very well and there's an awful lot of ground

cover for them. Also, how much hardware and expertise they've managed to accumulate is unknown.

It's chiefly a U.S. operation, but local troops will be working with MERLIN to do some mopping up, so you're there to impress. The operation has great political significance, that's why Washington has sent several million dollars worth of military hardware to some backwater desert.

It's the first time the U.S. has gone against the drug cartels in this region. So, your performance will reflect on the capability of America's armed forces.

You can't afford to mess this one up.

CAMPAIGN THREE – Central America

The U.S. has a long term involvement in this region. Your hosts, the government, has been fighting a war against Soviet backed guerrillas for the past twenty years. MERLIN has been called in to regain control of a town which has fallen into the hands of the guerrillas.

It seems the locals have been having a great deal of trouble keeping the place secure for some time. They finally lost control of the situation about ten days ago and have had no choice but to leave the area. Obviously they are desperate to return but are outnumbered by the guerrillas, that's why they need your help.

The entire territory to the West of your base is guerilla occupied and it's all dense jungle. That should work in your favour, by slowing down their movement quite considerably, since they can only move their heavy armour by road. However, it's their territory, and there's plenty of cover.

Whatever you do, don't underestimate their ability. They're serious about their cause and we gather from intelligence sources that they may be able to call in heavy air support if it proves necessary

CAMPAIGN FOUR – Middle East

MERLIN has been selected to help sort out a situation which always seemed likely to happen.

This region has always been prone to territorial disputes. These have previously been left to be resolved by the parties involved. However, our enemy has decided that the Straits belong to them, a problem, since they are officially designated as International waters.

You're to go in to help rid the area of gunboats which are preventing normal shipping from passing through the Straits. This area is one of the world's busiest shipping routes, and when you have supertankers laden with millions of gallons of highly inflammable oil products, you can see the urgency.

Intelligence reports show that their airforce is also showing a fairly heavy presence in the area and are equipped with MIG-29 Fulcrums. They're also using Hind-A gunships. Certainly some heavy duty hardware and they also have the pilots to match.

As the offshore oil terminals and rigs are of strategic importance, control of these installations means control of the Straits. You have to protect them from enemy occupation.

Once the enemy has been forced back into his own territory, you'll be making a number of retaliatory strikes, in order to persuade them not to do it again.

The Straits have great international importance as most major oil companies have facilities out there. You can't afford to mess this one up. The world's eyes will be upon you.

CAMPAIGN FIVE – South East Asia

The U.S. have had a fairly active involvement in this area, ever since the troubles began there more than twenty years ago. You will be based on one side of the border between two opposing countries. Your neighbours across the border, have been trying to take control of your host's country since the early 70's.

Recently their actions have taken the form of raids across the border, into friendly territory. Each raid has been designed to disrupt transportation or interfere with the political system, but as yet have failed. This has been due to the strength of your host's army, a small but highly trained force. However, something has happened recently which could easily tip the balance in the enemy's favour.

In several recent border incidents, chemical weapons have been used by the enemy. This came as a total surprise and serious casualties were taken.

Initially it was believed that the chemical weapons were being brought in from external sources. However, after a successful reconnaissance mission we have confirmed sightings of laboratories where these deadly substances have been made.

The use of such weapons has so far been limited, but on a larger scale it could mean that the enemy could just walk in.

That is why MERLIN has been called upon, to eradicate the chemical threat.

Your operation will begin with a raid to strip out the enemy's early warning capability. You will then make raids on sites identified as laboratories which are being used to manufacture the chemical weaponry.

It is the intention not to leave the area until the chemical threat has been completely neutralised.

CAMPAIGN SIX – Alaska

There's nothing like a sudden change of climate – three U.S. special research bases in a remote part of Alaska – Alpha, Beta and Omega – have been out of contact for the past week.

They have been working on biological research, in particular, defences to known biological weapons. They were located so far north because of their remoteness from population centres and the climate. In theory, if an accident occurs here, any escaping biological matter would not survive the intense cold.

Recently, the Soviets have been showing an interest in the area, and have made several complaints to the U.S. Government concerning the proximity of these bases to their border. It is certain that they know that the U.S. have been shipping biological weapons to these bases, but we don't think that they know why. It appears they fear some form of biological weapon is being developed rather than defences against them, despite our assurances to the contrary.

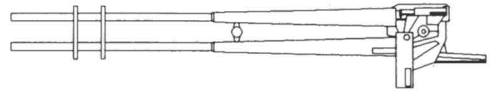
Five days ago, a recon. satellite picked up a large amount of Soviet hardware heading towards the border. Shortly afterwards, all contact was lost with the three bases.

You're to go in to check out why. Unfortunately, due to the top secret nature of the research you have limited information. What is known is that MERLIN must prevent the biological weapons from falling into the wrong hands. Otherwise, you could have a real crises on your hands.

WEAPONS SPECIFICATIONS

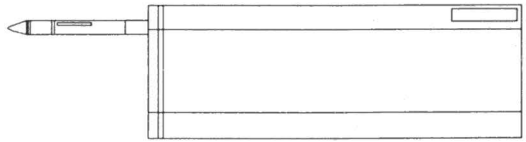
CANNON:

Fitted as standard to the Thunderhawk is a 30mm three barrelled chain gun. The gun is only really effective at ranges under ½km but inside that range it is a potent weapon against both ground and air targets. The only things that the gun is ineffective against are large structures such as bridges and factories. The 1200 rounds of ammunition are fired off in 6-round bursts and normally 3 or 4 bursts are sufficient against soft (unarmoured) targets.



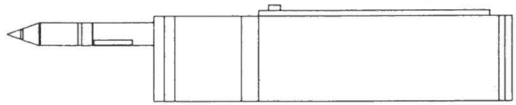
FFAR rocket pod:

Fitted in pods of 26 or 47 rockets and with a maximum range of approximately 1.5km the unguided Folding Fin Aerial Rocket is a highly versatile weapon. Although only accurate to around ½km, the FFAR is a potent weapon within that range, being effective against all vehicles and small structures.



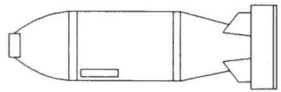
MWAR rocket pod:

Fitted in pods of 6 or 10, the MWAR is a 4-warhead version of the FFAR with similar range and effectiveness. A single large rocket is fired which splits into 4 separate warheads at a range of around ¼km.



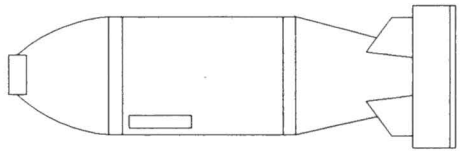
MK-81 Bomb:

Standard 250lb. high-drag bomb effective against all structures. It should be noted that use of these bombs below 250 feet will cause blast damage to your aircraft.



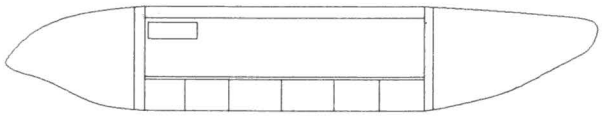
MK-82 Bomb:

Standard 500lb. high-drag bomb highly effective against all structures (a single MK-82 will destroy most structures outright). Due to the size of these bombs, its use below 500 feet is not advisable.



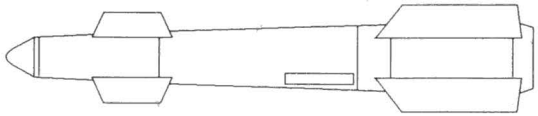
RCS-233:

Runway Cratering System, developed from a larger British version designed for fixed-wing aircraft. The RCS fires a cluster of small bombs downwards into the runway causing a large number of deep craters. The targeting system automatically selects the best launch pattern to ensure maximum damage.



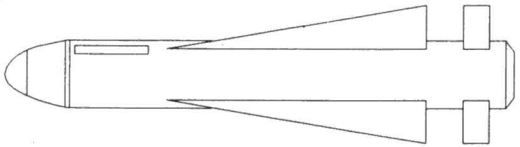
AGM-214 Firestorm:

Short-range derivative of the laser-guided Hellfire missile. Highly effective against all ground vehicles up to a range of around 4 km. Using the TADS system to designate target means that the target must remain selected up to the point of impact. This fact can be used to your advantage by firing multiple missiles and redesignating as each missile hits. The Firestorm is available in pods of four or seven missiles allowing you to carry a maximum of 28.



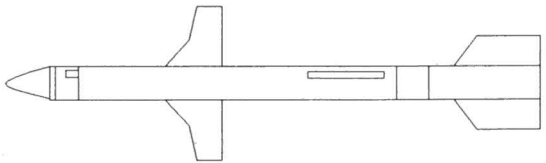
AGM-65P Maverick:

Compact version of the original AGM-65D featuring advanced thermal-image targeting for an effective range of 5 km. Being a fire-and-forget weapon, the Maverick is ideal for use with pop-up tactics. Available in packs of 1, 2 or 3 missiles.



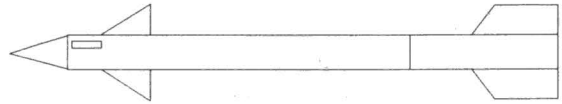
AGM112-L SMARM:

The Smart Anti-Radar Missile is designed to home in on enemy radar-sources. The 'SMART' auto designation system means that no target designation is required, the missiles are simply fired in the general direction of the target with a stand-off of up to 6 km. This makes it particularly effective against SAMs and early warning stations. The SMARM is controlled by the helicopter's fire-control computer allowing the missiles to communicate, ensuring that missiles will not choose the same target. SMARMs are available in racks of 1 or 2 missiles.



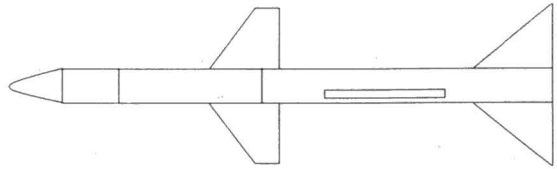
AIM-10B Cobra:

Short range infrared guided air-to-air missile. The guidance system uses several IR frequencies allowing the missile to lock-on to surface heat rather than exhaust plume. This reduces the chances of the missile being jammed or decoyed by enemy aircraft. The effective range of the Cobra is around 2.5km and the missiles come in racks of 2 or 4.



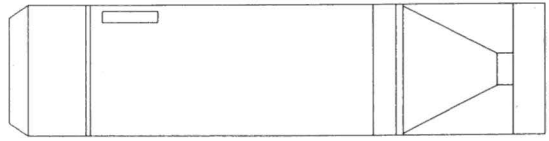
AIM-11F Swallow:

Medium range radar-guided air-to-air missile. A development of the AIM-7 with an improved radar seeker and compact motor. The relatively large warhead makes the Swallow an effective weapon against even the most heavily armoured gunship. The effective range is around 6km and 1 or 2 can be carried on each pylon.



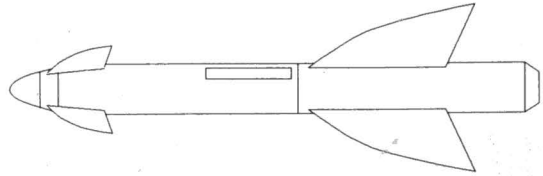
MK-54 Depth Bomb:

Standard high explosive depth bomb using automatic fuse selection controlled by the fire-control computer. Effective to depths of up to 2000 ft. and compact enough for up to 2 to be carried under each pylon.



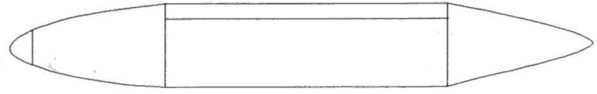
AGM-219 Penguin:

Medium range anti-shipping missile guided by infrared. Effective against all surface marine targets and almost impossible to decoy, the Penguin represents the most effective weapon against the heavily armed gunboats. With an effective range of 8km, the Penguin can be launched outside the detection range of most surface vessels minimising risk of counterattack. Due to its size, only one Penguin can be carried under each pylon.



ALQ-197 Radar Jamming Pod:

Large external pod featuring a comprehensive array of radar jamming equipment. The pod, linked to the fire control computer, will automatically detect threats and can launch chaff as well as activating the radar.



COMBAT TACTICS

Compared with a fixed-wing aircraft, the helicopter gunship appears to have grave performance limitations – being relatively slow and carrying only a fraction of the ordinance. The facts are offset by the helicopter's unique ability to fly very low at relatively low speeds. This makes the helicopter both difficult to detect and, if detected, difficult to destroy. At altitudes below 120 ft. it is almost impossible for surface radar to detect and at speeds below 100 km/h even the Doppler radar of aircraft cannot reliably detect a helicopter. This means the only effective way of picking up helicopters is visually and therefore only from very short range. In over 40 years of development, the combat helicopter has evolved into a sophisticated, multi-role weapon with a wide range of powerful weapons. Against surface targets, the gunship can achieve massive kill ratios and with the development of new armaments, the gunship is now probably the most versatile battlefield weapon. In spite of the advances in technology, though, the helicopter remains a large, slow moving target to an enemy gunner and so careful combat planning is vital if you are to return in one piece.

GROUND ATTACK

As already discussed, the helicopter's survival against hostile air defences depends on the pilot FLYING LOW. Using hills, buildings and other obstructions as cover, massively decreases your chances of detection. Always plan your route to avoid heavy concentrations of enemy units and avoid using radar jammers for extended periods (given time, the enemy can pinpoint the source of jamming). To fly at low altitude requires skill and the increase in protection results in lower flight speeds (flying low and fast is suicidal !).

In most situations, the enemy will have a good number of AAA and SAM sites making incautious attacks fatal. Keeping a close eye on the threat displays will give you a few moments warning to use countermeasures or to gain cover. Inexperienced pilots will tend to rush towards the target at full speed; there are no points for speed and moving fast makes low flight difficult, you will simply end up in trouble faster.

During an attack, speed is the single most important factor, the element of surprise is lost and the enemy will be concentrating all their firepower onto your aircraft. Popping up from behind cover is usually the best method and by using launch-then-designate tactics, you are exposed to hostile fire for the absolute minimum of time.

Always remember that your mission objective is the most important target, do not be tempted to waste ammunition on unnecessary attacks, it doesn't win medals, or praise and will simply draw attention to your presence.

In all cases, a live pilot is preferable to a dead hero, if it gets too hot, run for base.

FLYING OVER WATER

A calm sea makes for minimum turbulence, maximum vision and overall easy flying. The enemy also benefit; excellent radar vision and easy targeting due to your aircraft being camouflaged for land operations. Flying over water, you should keep an eye on the radar warnings. Since there is very little cover, the only real defence is ultra-low flight and a finger on the jammer switches.

It must also be noted that gunboats will always carry at least 1 AA-cannon and quite often the crew will have shoulder launched SAMs. Flying close to larger ships is nearly always a mistake since they will always have powerful anti-aircraft defences.

FLYING IN EXTREME CLIMATES

When flying in arctic conditions a helicopter will produce an extremely large infrared signature by simple virtue of the temperature difference. In these conditions it is easy for enemy units to lock onto infrared missiles so a careful watch should be kept on the IR warning light and a finger on the flare launchers.

In a hot climate, the efficiency of the turbine engine is reduced making the aircraft feel sluggish and underpowered. Although this is not a large problem, it is wise to allow a few extra feet of ground clearance and an extra moment to gain cover.

HELICOPTER VS FIGHTER

The fighter pilot does not see the low flying helicopter as an easy target. If there are any ground obstacles the fighter cannot safely fly below 150 ft. and even flight as low as this requires a great deal of skill. Less experienced pilots will not venture so low, making their attack even more difficult. If the helicopter is flying slow, Doppler radar will not pick it up, preventing the fighter from locking on radar-guided missiles. Helicopters do not produce particularly strong IR emissions so infrared guided missiles are also tricky to use. In the end the fighter pilot will probably resort to using a fixed sight cannon. To use the cannon, the pilot must fly flat and low and many pilots will consider this too great a risk. If the pilot does attempt a strafing run, the retreating jet provides the helicopter pilot with a large IR signal which is easy to lock on to. Overall, as long as the helicopter pilot stays calm, the fighter can be kept at a disadvantage and will, in all probability, retreat from the fight.

HELICOPTER VS HELICOPTER

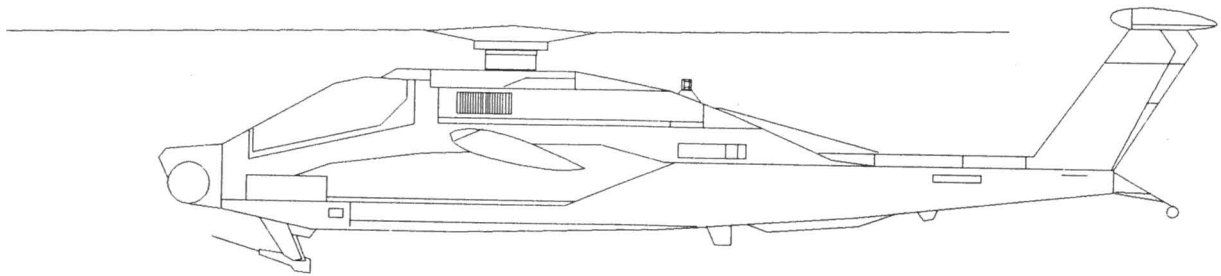
More dangerous than fixed wing aircraft, the gunship's main enemy is other gunships. Performance of the two aircraft is is closely matched and pilot skill is usually the deciding factor. At longer ranges, air-to-air missiles should always be used, failing this, switch to cannon and attempt to outflank your opponent. The Thunderhawk possesses better handling characteristics than any other rotary wing craft although it is certainly not the fastest. For this reason, outrunning the enemy gunship is unlikely and inadvisable. Always use ground cover and try to make the enemy waste his ammo and flares (you can carry more than him). When he is reduced to using his cannon, gain a little distance and pick him off using IR guided missiles.

Allied Hardware

AH-73M Thunderhawk

Crew	–	1
Overall Length	–	65 ft
Height	–	9 ft
Rotor Diameter	–	45 ft
Max Takeoff Weight	–	15500 lbs
Maximum Speed	–	192 knots
Main Weapon	–	Various
Secondary Weapon	–	Cannon

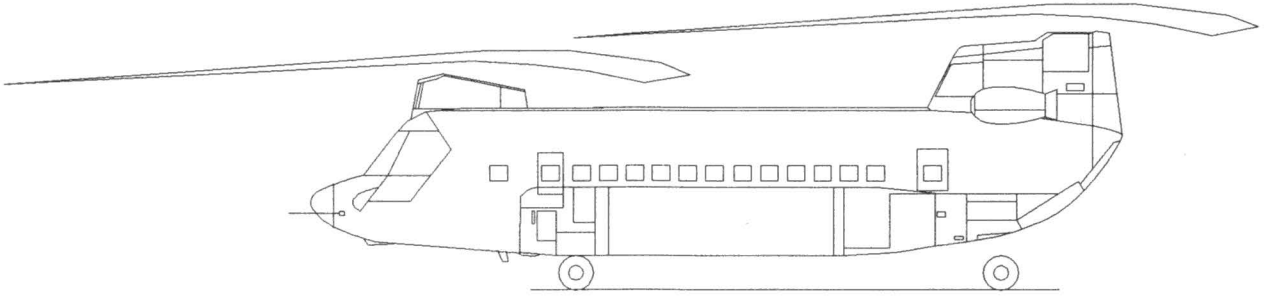
Currently the most advanced gunship flying. The Thunderhawk features an advanced fire-control computer allowing the single crewman to fulfil the dual role of pilot and gunner.



CH-47 Chinook

Crew	–	2
Overall Length	–	99 ft
Height	–	18 ft
Rotor Diameter	–	60 ft
Max Takeoff Weight	–	54000 lbs
Maximum Speed	–	135 knots

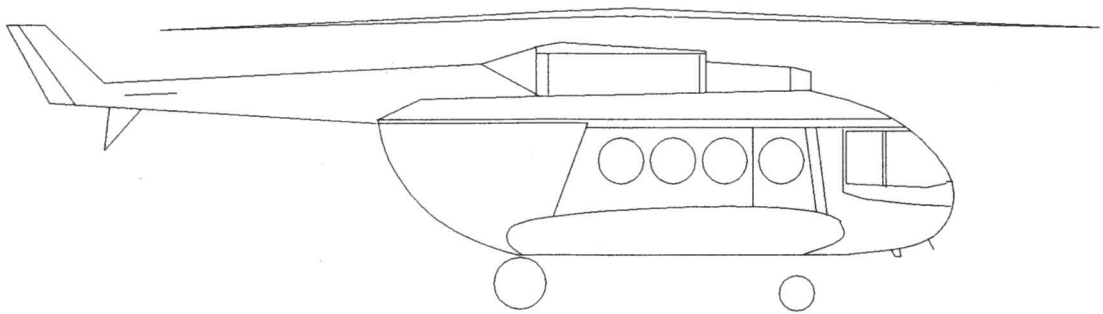
Medium range heavy transport helicopter used by many western forces. With a maximum payload of 23000 lbs, the Chinook is capable of carrying large internal and external loads over several hundred miles.



Mil Mi-8 Hip-C

Crew	–	2
Overall Length	–	82 ft
Height	–	17 ft
Rotor Diameter	–	69 ft
Max Takeoff Weight	–	26450 lbs
Maximum Speed	–	125 knots

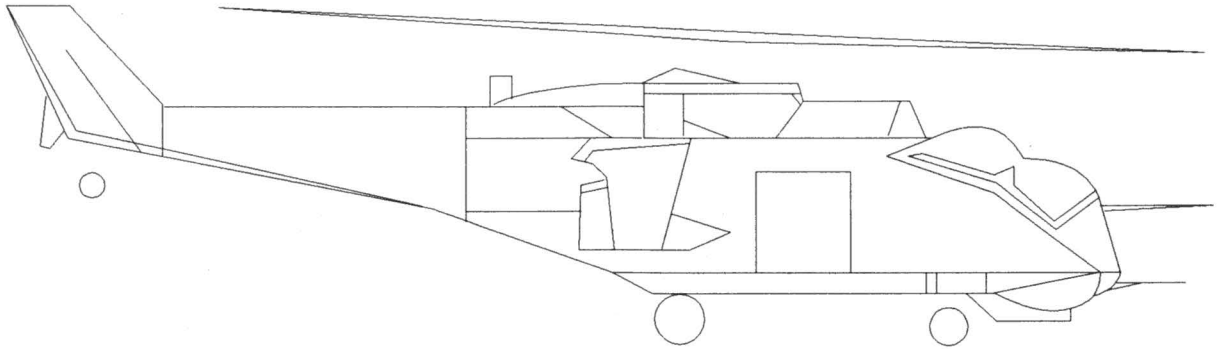
Multi-role transport helicopter used by many nations for both troop and supply transport within the battlefield environment. Although generally unarmed, the Hip will usually carry chaff and flare cartridges.



Mil MI-24 Hind-A

Crew	–	3
Overall Length	–	69 ft
Height	–	21 ft
Rotor Diameter	–	56 ft
Max Takeoff Weight	–	25300 lbs
Maximum Speed	–	160 knots

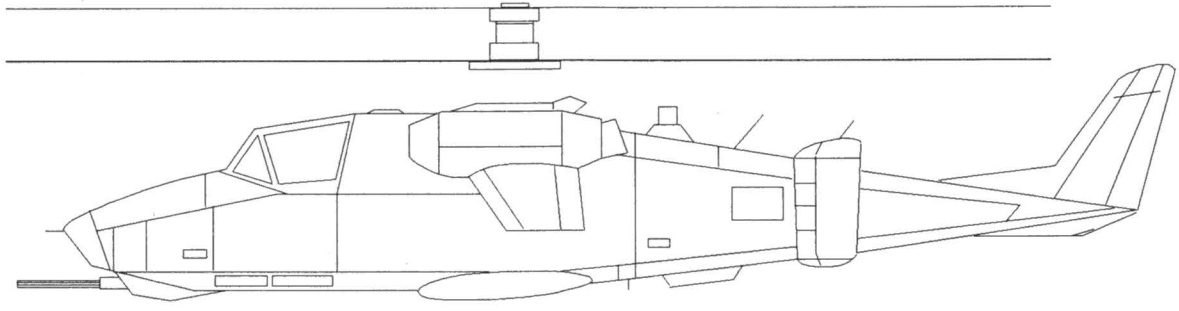
Multi-role combat helicopter used by many eastern countries as well as the Soviet army itself. Considering its large mass, the Hind is remarkably fast and can carry a large range of guided and unguided missiles. Engines and cockpit are well armoured making the Hind the most difficult helicopter to knock down. Most versions carry a 4-barrelled 12.7mm cannon as well as flares, chaff and jamming pods. The only design weakness is the lack of high speed manoeuvrability putting the pilot at a great disadvantage in dogfights.



Kamov Ka-136 Hokum

Crew	–	2
Overall Length	–	43 ft
Height	–	21 ft
Rotor Diameter	–	45 ft
Max Takeoff Weight	–	17200 lbs
Maximum Speed	–	206 knots

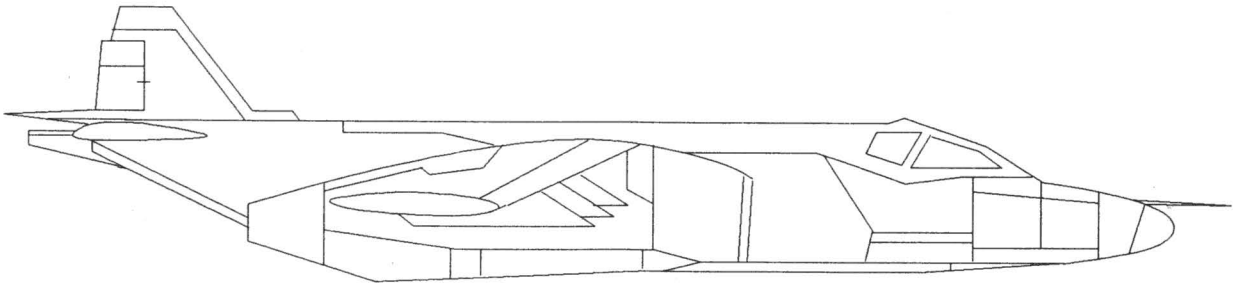
Ground attack helicopter used primarily by Soviet forces. The Hokum is by far the most advanced eastern bloc helicopter being both faster and more heavily armed than any western counterpart. Only a limited number are currently in use but it can be assumed that several other countries will also have taken delivery of a small number. The Hokum, therefore, poses the greatest threat to western gunships, its only weak point being relatively crude night-vision and jammers.



Sukhoi Su-25 Frogfoot

Crew	–	1
Overall Length	–	39 ft
Height	–	17 ft
Wingspan	–	36 ft
Max Takeoff Weight	–	41000 lbs
Maximum Speed	–	560 knots

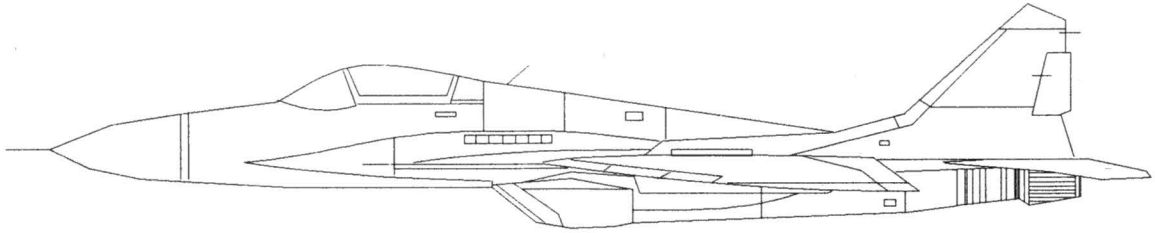
Ground attack aircraft currently used by at least 11 nations. The Frogfoot is the Soviet equivalent of the Fairchild A10, being relatively slow, heavily armoured and with the ability to carry large amounts of ground attack ordinance. The Frogfoot is a highly manoeuvrable plane with an exceptionally slow stall speed. This allows the pilot to make highly accurate attacks on both ground and air targets. All Frogfoots carry large numbers of flares and chaff cartridges.



Mikoyan Mig-29 Fulcrum

Crew	–	1
Overall Length	–	43 ft
Height	–	18 ft
Wingspan	–	41 ft
Max Takeoff Weight	–	37000 lbs
Maximum Speed	–	1580 knots

Hailed as the world's finest air superiority fighter, the Fulcrum has been adopted by the air forces of Iraq, India and Finland amongst others. It is without doubt a serious threat to other jet fighters, carrying a large load of long-range air-to-air missiles. Due to its design, the Fulcrum does not handle well at low speed and is therefore unsuited to dogfighting with helicopters. The inboard radar is very powerful and cannot easily be jammed and can even see through clouds of chaff.



Grail Shoulder-Launched AA missile

Overall Length	–	4 ft
Search Type	–	Optical
Armament	–	1 SA-7 missile

Around 1 in 20 ground troops will carry a shoulder-launched AA missile launcher. Although not dangerous in isolation, multiple hits will cause damage making it advisable to avoid enemy troop concentrations.

Gecko Low Altitude SAM system

Crew	–	3
Overall Length	–	32 ft
Height	–	7 ft
Width	–	9 ft
Search Type	–	Radar
Armament	–	4 SA-8b missiles

Probably the world's most widely used SAM system, the Gecko is a relatively old design being easily jammed. The infrared backup is extremely crude and flares will confuse the missile under most circumstances. Nevertheless, the warhead is large and will certainly cause serious damage to most aircraft.

Gaskin Low Altitude SAM System

Crew	–	3
Overall Length	–	17 ft
Height	–	7 ft
Width	–	8 ft
Search Type	–	Optical
Armament	–	6 SA-9 missiles

Using optical search means that the Gaskin is only a threat at short range, and inside that range only multiple hits can seriously damage a modern gunship. Even so, large concentrations of Gaskins should be avoided.

Gopher Low Altitude SAM System

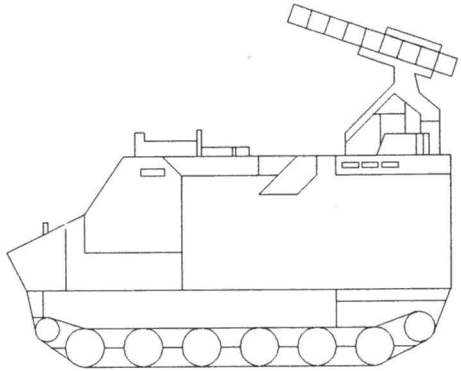
Crew	–	3
Overall Length	–	22 ft
Height	–	13 ft
Width	–	11 ft
Search Type	–	Radar
Armament	–	4 SA-13 missiles

The warhead of the SA-13 missile is relatively small, even so the guidance system is relatively advanced and not easily decoyed.

Gadfly Low-to-Medium Altitude SAM System

Crew	–	4
Overall Length	–	32 ft
Height	–	14 ft
Width	–	10 ft
Search Type	–	Radar
Armament	–	2 SA-11 missiles

The Gadfly represents a large threat to enemy aircraft. The tracking system is highly advanced and therefore difficult to jam. The warhead is very large and a direct hit will certainly cause a great deal of damage.



Shilka ZSU-23-4 Mobile AA Gun

Crew	–	4
Overall Length	–	21 ft
Height	–	10 ft
Width	–	11 ft
Search Type	–	Radar
Armament	–	4 x 23mm automatic cannon

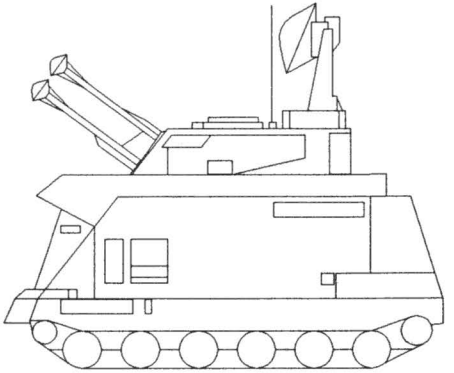
At close range the Shilka poses a great threat for all but the most heavily armed aircraft. Although the shells are of a smallish calibre, the Shilka maintains a very high fire rate producing heavy cumulative damage.

No illustration available

ZSU-57-2 Mobile AA Gun

Crew	–	7
Overall Length	–	28 ft
Height	–	8 ft
Width	–	10 ft
Search Type	–	Optical
Armament	–	2 x 57mm automatic cannon

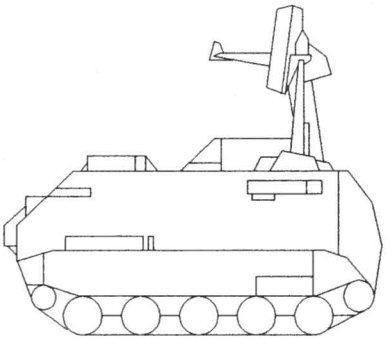
Although technically obsolete, the ZSU is deadly against all aircraft. The large calibre shells cause heavy damage and since it is optically guided, it will not appear on the threat display.



Mobile Radar Vehicle

Crew	–	4
Overall Length	–	26 ft
Height	–	12 ft
Width	–	9 ft

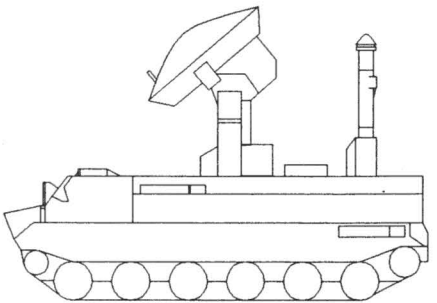
Widely used by most nations, the mobile radar provides both early warning of impending attacks and provides guidance for interceptors and air defences.



Command and Communication Vehicle

Crew	–	5
Overall Length	–	28 ft
Height	–	13 ft
Width	–	11 ft

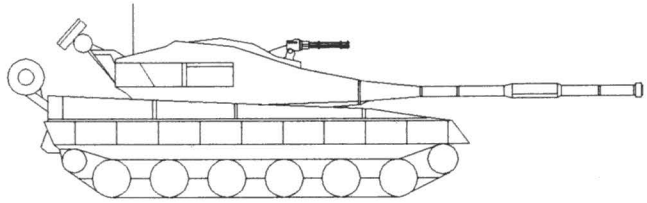
Used to co-ordinate forces and relay early warning information. These vehicles are generally found well behind the front line and are usually accompanied by SAM and AAA units.



T-84 Main Battle Tank

Crew	–	3
Overall Length	–	29 ft
Height	–	10 ft
Width	–	16 ft
Armament	–	125mm smoothbore cannon + 12.7mm machine gun

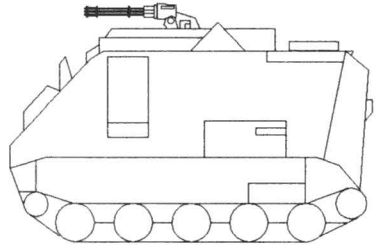
Soviet main battle tank, this all new design is already being copied by the Chinese army amongst others. The turret mounted machine gun poses little threat to an armoured gunship.



MT-LB Armoured Carrier

Crew	–	2
Overall Length	–	24 ft
Height	–	7 ft
Width	–	10 ft

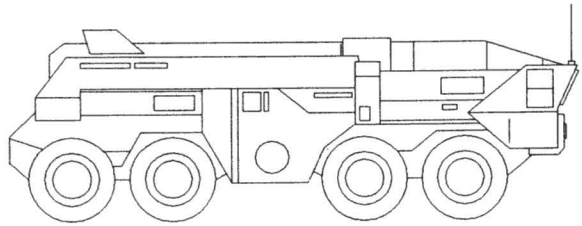
General purpose transport as used by virtually all countries.



SCUD Launcher

Crew	–	5
Overall Length	–	46 ft
Height	–	15 ft
Width	–	18 ft

Medium range ballistic missile launcher. Used by several Middle-Eastern nations as well as the Soviets themselves.



Credits

Produced by	–	Jeremy Heath-Smith
Game Design	–	Mark (Mac) Avory Simon Phipps Mark Price Sean Dunlevy
Coding		
Commodore Amiga & Atari ST	–	Mark (Mac) Avory
IBM PC	–	Sean Dunlevy
Additional Coding	–	Rob Toone
Music & Sound Effects	–	Martin Walker
Graphics	–	Jason Gee
3D Object Design	–	Mark (Mac) Avory Mark Price
Manual	–	Kevin Norburn Sean Dunlevy Mark Price
Play Testing	–	Bob Churchill Mark Price Darren Price

Tradewinds House, 69/71A Ashbourne Road, Derby DE3 3FS Telephone: (0332) 297797